SERVICE MANUAL

Invacare® Meteor

This manual contains instructions about
- troubleshooting
- repair

CE

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INVACARE®

Contents

Chapter Page

1 General information 5

1.1 Before you start 5

1.2 Qualifications for service technicians 5

1.3 Transport back to the manufacturer 5

1.4 Invacare® service 6

2 Safety and assembly instructions 8

2.1 Symbols used in these service instructions 8

2.2 Before any inspection or repair work 8

2.3 During dismantling/reassembly 9

2.4 Before operation / after completion of service work: 10

2.5 Tool list 10

3 The Invacare® Meteor in overview 11

3.1 Layout of modules, components and displays and controls 11

3.2 Module composition / variations, accessories 11

3.2.1 Module composition / variations 11

3.2.2 Accessories 11

4 Inspection plan 12

5 Operational faults 13

5.1 General 13

5.2 Fault causes 14

6 Electronics error codes 15

6.1 General 15

6.2 Error code description 15

7 Repair and replacement 17

7.1 Seat unit 17

7.1.1 General 17

7.1.2 Armrests 18

7.1.3 Armrest receptacles 18

7.1.4 Headrest 18

7.1.5 Seat belt ... 19
7.1.6 Seat ... 19
7.1.7 Release lever ... 20
7.1.8 Seat rails ... 20
7.1.9 Top seat tube ... 21
7.1.10 Seat plate ... 21
7.2 Handlebar, operating console ... 23
7.2.1 General ... 23
7.2.2 Operating console and keypad ... 25
7.2.3 Steering column panelling ... 26
7.2.4 Steering column adjustment Bowden cable ... 26
7.2.5 Drive regulator ... 27
7.2.6 Potentiometer ... 28
7.2.7 Lightbulbs, front ... 28
7.2.8 Headlights ... 29
7.2.9 Handlebar ... 29
7.2.10 Steering column ... 30
7.3 Panelling ... 31
7.3.1 Front panelling (three-wheeled version) ... 31
7.3.2 Front panelling (four-wheeled version) ... 32
7.3.3 Rear panelling (three and four-wheeled version) ... 33
7.3.4 Lightbulbs, rear ... 33
7.4 Wheels ... 34
7.5 Disk brake ... 34
7.5.1 Brake Bowden cable ... 34
7.5.2 Brake calliper ... 35
7.5.3 Brake disc ... 35
7.6 Front wheel suspension, three-wheeled version ... 37
7.6.1 General ... 37
7.6.2 Front wheel axle ... 39
7.6.3 Shock absorber, front ... 40
7.6.4 Wheel fork ... 41
7.7 Front wheel suspension, four-wheeled version ... 42
7.7.1 General ... 42
7.7.2 Shock absorber, front ... 44

7.7.3 Steering linkage 45
7.7.4 Stub axle 47
7.7.5 Transverse control arm 47
7.7.6 Fork steering tube 48
7.8 Batteries 49
7.8.1 Checking the battery (batteries) battery cable and fuses 49
7.8.2 Removing or refitting battery (batteries) 49
7.9 Electronics box 50
7.9.1 Removing the electronics box 50
7.9.2 Refitting the electronics box 50
7.10 Drive 51
7.10.1 Disassembly 51
7.10.2 Reassembly 52
7.10.3 Replacing carbon brushes 52

1 General information

1.1 Before you start

This service manual contains information and servicing instructions which are necessary for the maintenance and overhaul of the Invacare® Meteor.

All maintenance and overhaul work must be carried out in accordance with these repair instructions. Information contained in the operating manual also applies to general maintenance and care work.

Observe the safety information.

You can find information about ordering spare parts in the spare parts catalogue.

1.2 Qualifications for service technicians

The Meteor may only be maintained and overhauled by qualified personnel. Minimum requirements:

- Relevant training such as bicycle or orthopaedics mechanic or suitable long-term professional experience.
- Safe handling of electrical measurement instruments (multimeter).

1.3 Transport back to the manufacturer

If the Meteor has to be shipped back to the manufacturer for major repairs, you should always use the original packaging for transport.

You should also include as accurate a fault description as possible.

1.4 Invacare® service

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- Alterations to the Meteor which occur as a result of incorrectly or improperly executed maintenance or overhaul work lead to the exclusion of all liability on the side of Invacare®.

2 Safety and assembly instructions

The safety instructions are intended as prevention of accidents at work and it is imperative that they are observed.

2.1 Symbols used in these service instructions

✓ NOTE:
This symbol identifies notes on correct carrying out of service measures, in addition to specialities and simplifications during disassembly and reassembly.

⚠ **Caution**:
The Caution symbol identifies potential hazards for the service technician or for the Invacare® Meteor. Always take careful note of any safety instructions identified through the use of this symbol. Serious injury hazards or danger to life are additionally identified through the use of the "Hazard!" symbol.

2.2 Before any inspection or repair work

⚠ **Caution**:
HAZARD!
Please note the high weight of some components. This applies especially to removal of drive units and batteries. Make sure that you are able to remove and deposit the components safely during the relevant disassembly work.

⚠ **Caution:**
HAZARD!
Danger of injury! Remove any metal watches or rings or metal chains before carrying out any service work on the batteries. Risk of short-circuit at batteries or any cables or components directly connected with the batteries. A short-circuit can lead to serious injuries.

Read this repair manual and the relevant operating manual carefully through before carrying out any work and observe all information given there. Observe the minimum requirements for carrying out the work (see chapter entitled " General information).

The Invacare® Meteor must be switched off before removal of voltage-carrying components. First remove the negative and then the positive terminal clamp from the battery, and then remove the batteries.

Use only undamaged tools in good condition.

When making measurements on voltage-carrying components, avoid short-circuiting the contacts.

2.3 During dismantling/reassembly

Mark all current settings for the wheelchair (seat, armrests, backrest etc.), and the cable connecting plugs associated, before any removals. This makes reassembly easier. As a basic rule, all work is described for the process of disassembly. If no other information is given regarding reassembly or reconstruction, you should assume that reassembly is carried out in reverse order to the stages used in disassembly. Any discrepancies to the actions used in disassembly, or special information about reassembly, can always be found at the end of the disassembly description.

⚠ Caution:

Prop up the wheelchair with appropriate supports before starting the disassembly or assembly.
Never use "normal" nuts instead of self-locking nuts.
Always use correctly dimensioned washers or spacers.

✓ Note:
Connecting plugs

All plugs are fitted with mechanical safety devices which prevent release of the connecting plugs during operation. To release the connecting plugs the locking devices must be pressed in. In order to remove the connecting plugs, these locking devices must be pressed together in the upper or lower plug area.
When reassembling ensure that these locking devices are correctly engaged. Batteries:
If the Invacare® Meteor needs to be laid on its side for the purpose of carrying out service work, the batteries must be removed first.
Orientation:
Information about orientation such as "left" or "right" always relates to the view in the direction of travel, whereby the observer is standing behind the Meteor.

2.4 Before operation / after completion of service work:

⚠ Caution:

Check all fixings for tight fit. Check all parts for correct interlocking. Only operate the wheelchair with correct tyre pressure (2.0 bar).
Always carry out a functional test of any components replaced in addition to a trial run after completing any service work.

2.5 Tool list

You will need a standard tool set with at least the following:

- set of open and ring spanner
- set of Allen keys
- torque wrench (commercial)
- socket spanner set
- set of screwdrivers (flat, Phillips and Torx)
- oblique pliers
- flat-nosed pliers
- circle pliers
- pointed pliers
- cable lug pliers
- wooden or plastic hammer
- tyre repair kit (commercial)
- tyre pressure indicator
- air pump
- valve removal tool
- internal remover and insertion or impact tool for ball bearings
- Multimeter with probes and various cable clips
- soldering iron 30 W
- pop riveting tool

3 The Invacare® Meteor in overview

3.1 Layout of modules, components and displays and controls

The following figures show the layout of Meteor modules**.** Removal and reassembly of spare parts is described in Chapter .7

✓ NOTE:
The arrangement of displays and controls for the three or four-wheel Meteor is the same. The three-wheel Meteor is used as an example in the following figures.

1. Drive lever
2. Lever for steering column inclination adjustment
3. Operating console
4. Handbrake lever
5. Keyswitch (ON/OFF)
6. Unlocking lever for moving seat rails (front right below seat)
7. Release leader for turning and removing seat (right below seat)
8. Disengaging lever.

3.2 Module composition / variations, accessories

3.2.1 Module composition / variations

The Invacare® Meteor is available as a three- or four-wheel variation with the following options:

- **Colour**
  - ruby red
  - sapphire blue

3.2.2 Accessories

The following accessories are available for the Invacare® Meteor

- **Basket assy. (rear)**
- **Cane holder assy.**
- **External mirror (right and / or left)**

4 Inspection plan

Component	Check	Remedy	Chapter:	✓
Wheel suspension and wheels	• Check drive wheels for tight fit and side play	⇒ Adjust, replace	**see operating manual**	
	• Check front wheels for tight fit, float and side play	⇒ Adjust, replace wheel, axle, wheel bearing or fork	**see operating manual** **7.6, 7.7**	
	• Check front wheel forks	⇒ Replace bearing	**7.6, 7.7**	
	• Check tyres	⇒ Fit new	**see operating manual**	
Lighting	• Check cabling	⇒ Replace cable if necessary		
	• Check function	⇒ Replace bulbs or cables if necessary	**7.2.7, 7.3.4**	
Drive	• Check functions in drive and push modes	⇒ Replace drive units, carbon brushes if necessary	**7.10**	
Chassis	• Check screw connections and battery straps.	⇒ Tighten screws / nuts, adjust or replace if necessary		
Batteries	• Damage to batteries, corrosion on contacts	⇒ Clean contacts, replace batteries	**7.8.1**	
	• Check contacts, terminal clamps, cables and strip fuses	⇒ Tighten, clean, replace if necessary		
	• Check battery voltage	⇒ Charge batteries / replace		
Operating console	• Operating console, status display flashing	⇒ Check cables, plugs and sensors		
	• Cable, connecting plug	⇒ Tighten, replace		

5 Operational faults

5.1 General

The electronic system offers diagnostic information to support the technician during the recognition and rectification of faults within the system. If an fault is present, the status display (the outside left LED of the battery charger display) will blink in groups with small pauses. The type of folders displayed by the number of blinks in each group, which are also known as the "blink code" or "error code".

The electronic system reacts differently depending on the seriousness of the fault and its effect on user safety. It can, for example:

- simply show the blink code as a warning and allow both driving and operation to continue
- display the blink code, stop the Meteor and hold it at a standstill until the electronic system has been switched off and switched on again
- display the blink code, stop the Meteor and not permit further driving until the fault has been rectified.

If faults occur in drive mode or power supply proceed as follows:

- First assess the fault causes described in Section 5.2.
- Check the status display at the operating consoled and evaluate the error codes in accordance with Section 6.2.
- Carry out the necessary testing / repairs**.** While doing this please note the references to the appropriate chapter in the manual or to the appropriate documentation.

5.2 Fault causes

Fault description	Fault cause	Fault remedy
Wheelchair will not start	disengaging lever set to "Rear", motor disengaged	push disengaging lever forwards
	operating unit status display has gone out	
	• batteries defective	replace batteries
	• completely discharge battery	pre-charge batteries
	• power supply interrupted	• check battery fuse. • check voltage at operating console • check voltage at batteries
	status display blinking on wheelchair	assess error code
Drive motor judders in drive mode	drive unit defective	replace drive unit
	carbon prices defective	replace carbon brushes.
Cannot charge batteries	batteries defective	replace battery
	charging device defective	replace charging device
Warning horn defective		check warning horn / replace if necessary
lighting defective		• check lighting (bulbs) / re-place if necessary
		• check cabling / replace if necessary

6 Electronics error codes

6.1 General

Before assessing error codes, carry out the following test:

- Turn the operating console on and off several times.

The test checks whether the error can be automatically rectified by the electronics, and if necessary deactivates the blinking status display at the operating console. If this is not the case, you can locate the fault using the blink codes as follows:

- Turn the operating console on and off.
- Check which blink code is showing by counting.
- Wait for the blink code pause (approx. 2-3 seconds).
- Recount the error code just to make sure.

6.2 Error code description

Check the display, the LED on the outside left of the battery charge display, and the electronics (operating console).The following list is based on the blink code:.

Blink Code	Fault	Consequence for the Meteor	Comments
1x	Battery must be charged	Continues to drive	Battery voltage has sunk below 23.3 V. Charge battery as soon as possible
2x	Battery voltage too low Lifter is raised	Stops driving Reduced driving speed	Battery voltage has sunk below 16.5 V. Recharge battery If you switch the Meteor off for a few minutes, the battery can often recharge itself to such a level that a short run is still possible. Completely lower lifter.

Blink Code	Fault	Consequence for the Meteor	Comments
3x	Battery voltage too high	Stops driving	The battery voltage has risen to over 32 V (due to running downhill too fast or defective battery charger). If the battery charger is connected, disconnect it from the Meteor. The electronic system charges the batteries when running downhill and when braking. This fault is caused when the battery voltage becomes too high during this process**.** Switch the Meteor off and on again
4x	Current delay exceeded	Stops driving	The maximum current has been exceeded for too long a period, the motor is probably overloaded or has been running against an immovable obstacle for too long. Switch of the meteor, wait a few minutes and then switch it on again. The electronic system has determined a motor short-circuit. Check the wiring harness for short-circuit and check the motor.
5x	Brake failure Brake circuit interruption	Stops driving	Ensure that the disengaging lever is pressed in. There is a defect in the braking coil or in the cabling. Check magnetic brake and cabling for open or short-circuited circuit.
6x	Meteor not in neutral when switched on	Stops driving	Drive lever is not in neutral when the keyswitch is turned. Set the drive lever in neutral, turn off and then turn on again. It may be necessary to recalibrate the drive lever.
7x	Fault in speed potentiometer	Stops driving	The drive lever electronics could be faulty or incorrectly connected.
8x	Motor fault	Stops driving	The motor or its cabling is defective
9x	Internal faults	Stops driving	Check electronics box

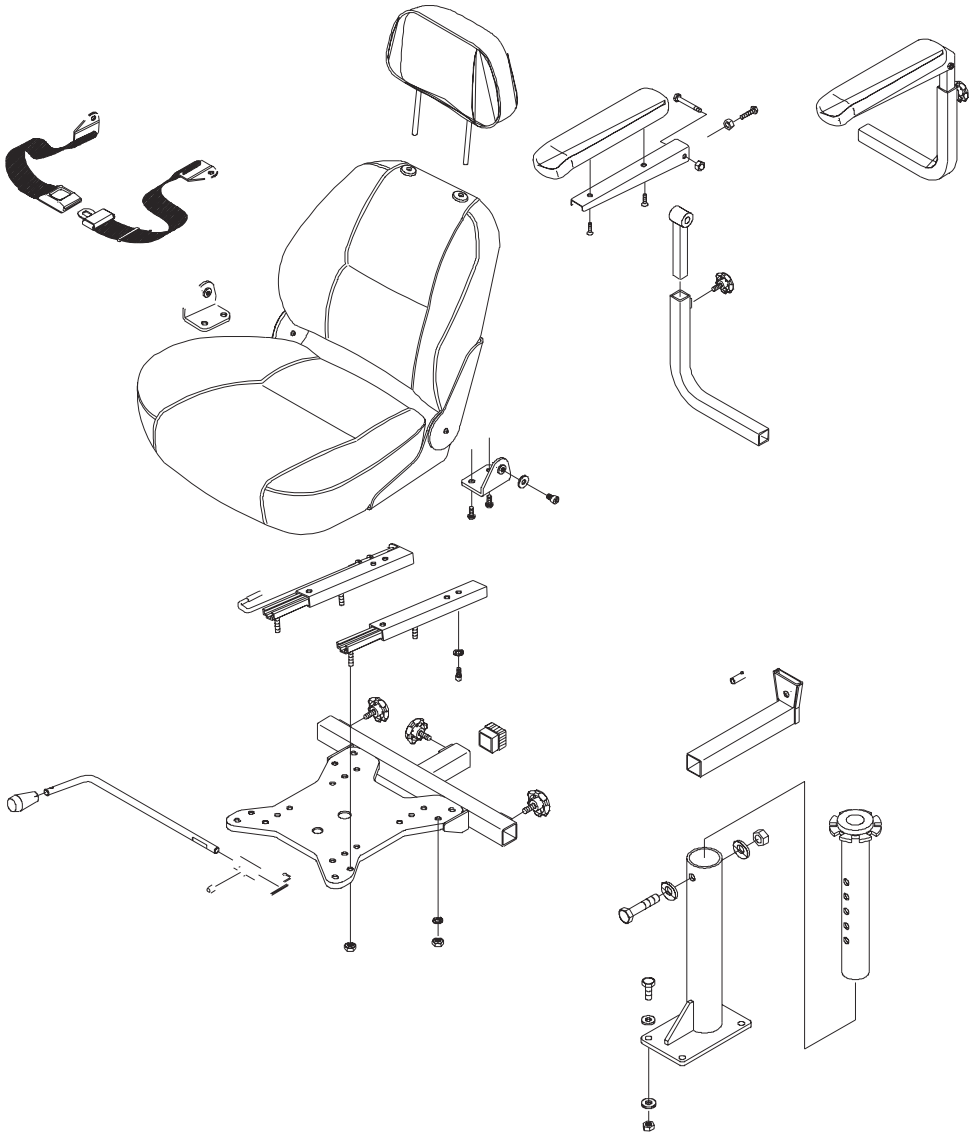
7 Repair and replacement

7.1 Seat unit

CAUTION:
seat adjustments such as seat depth, seat height, backrest angle and distance between armrests or the steering column should be individually adjusted to suit the user. The settings should be called up once again when service work is completed

7.1.1 General

The seat unit individual parts are shown in the following drawing.



7.1.2 Armrests

Disassembly

1. Loosen the handwheel under the armrest.
2. Pull the armrest out upwards.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.1.3 Armrest receptacles

Disassembly

1. Loosen handwheel beneath seat.
2. Withdraw armrest receptacle to the side.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.1.4 Headrest

1. Pull out the headrest while keeping the release button below the headrest pressed down.
2. Reassembly takes place in reverse order to disassembly.

7.1.5 Seat belt

Caution:
Only replace the seat belt complete, in other words both the left-hand and right-hand part together.

Disassembly

1. Loosen the Allen screw each side for the left-hand and right-hand seatbelt, and remove together with the seatbelt and one washer each.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.1.6 Seat

Caution:
Fold the backrest completely forwards onto the seat area to avoid danger of tipping once the screws have been removed.

Disassembly

1. Pull the release lever upwards, turn the seat a quarter turn to the left or right and raise the seat from the seat support.

2. Place the seat on a stable support.

Reassembly

1. Place the seat on the seat support and left the release lever upwards.

2. Allow the seat to slide within the seat support and

engage by turning slightly.

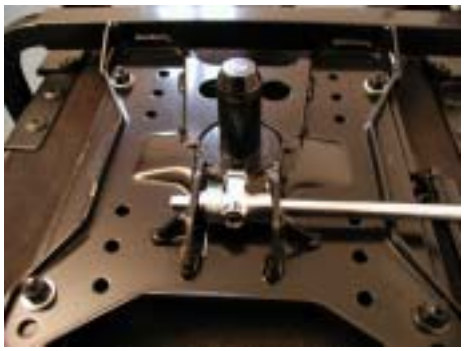
3. Let release lever go

7.1.7 Release lever

Caution:
Risk of crushing when working on slide rails, adjustment levers and springs!

Disassembly

1. Dismantle seat (see section 7.1.2).
2. Turn the seat round with the backrest folded down.
3. Loosen the release lever hex nut located under the seat support.
4. Disengage the torsion springs and replace release lever.



Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.1.8 Seat rails

Disassembly

Caution:
Risk of crushing when working on slide rails, adjustment levers and springs!

1. Dismantle seat (see section 7.1.2).
2. Turn the seat round with the backrest folded down.
3. Loosen the handwheel beneath the seat, pull the armrest supports with the armrests out to the side.
4. Unscrew all four hex nuts from the seat support and remove the seat support.
5. Unscrew the Allen screws on the seat edge rails and replace the seat rails.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.1.9 Top seat tube

Disassembly

1. Dismantle seat (see section 7.1.2).
2. Unscrew the hex bolts and nuts from the seat attachment and remove together with washers.
3. Pull the seat tube out and replace.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.1.10 Seat plate

Disassembly

1. Dismantle seat (see section 7.1.2).
2. Dismantle the top seat tube (see section 7.1.9).
3. Remove the Allen screw with together washers and nuts**.**
4. Remove the seat plate.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

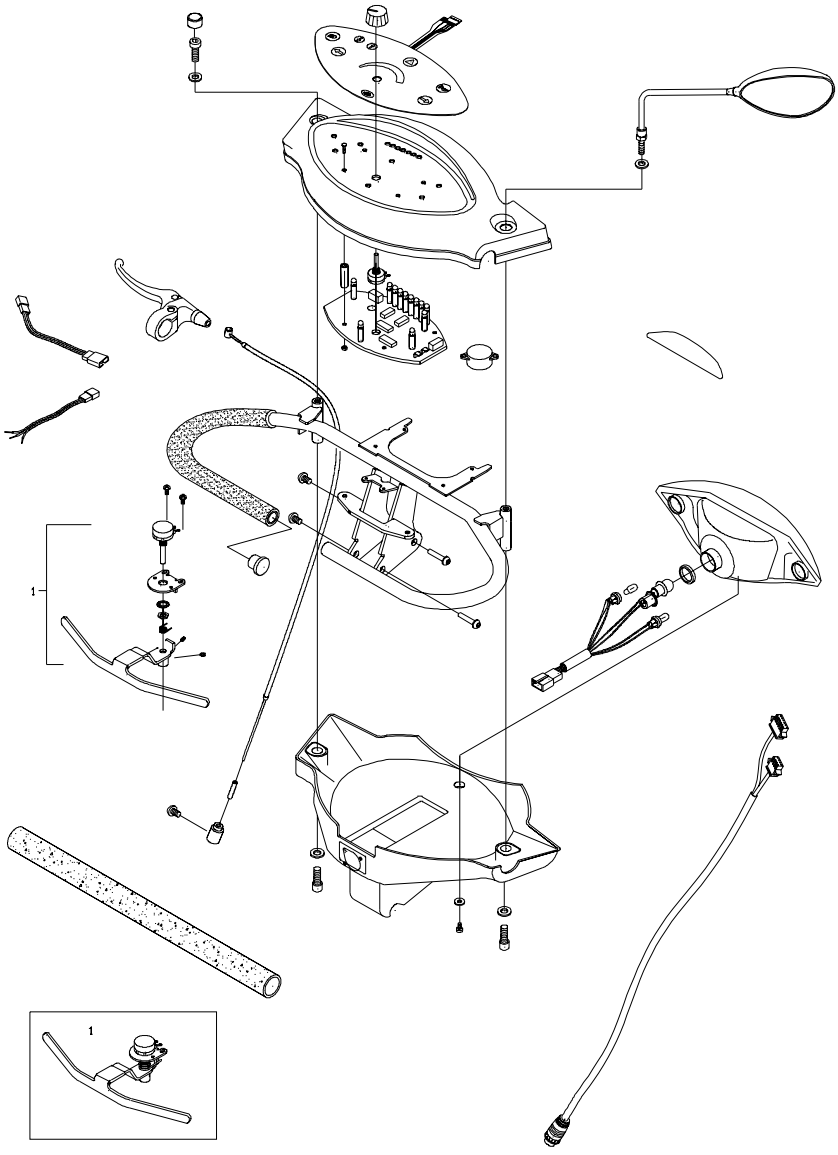
7.2 Handlebar, operating console

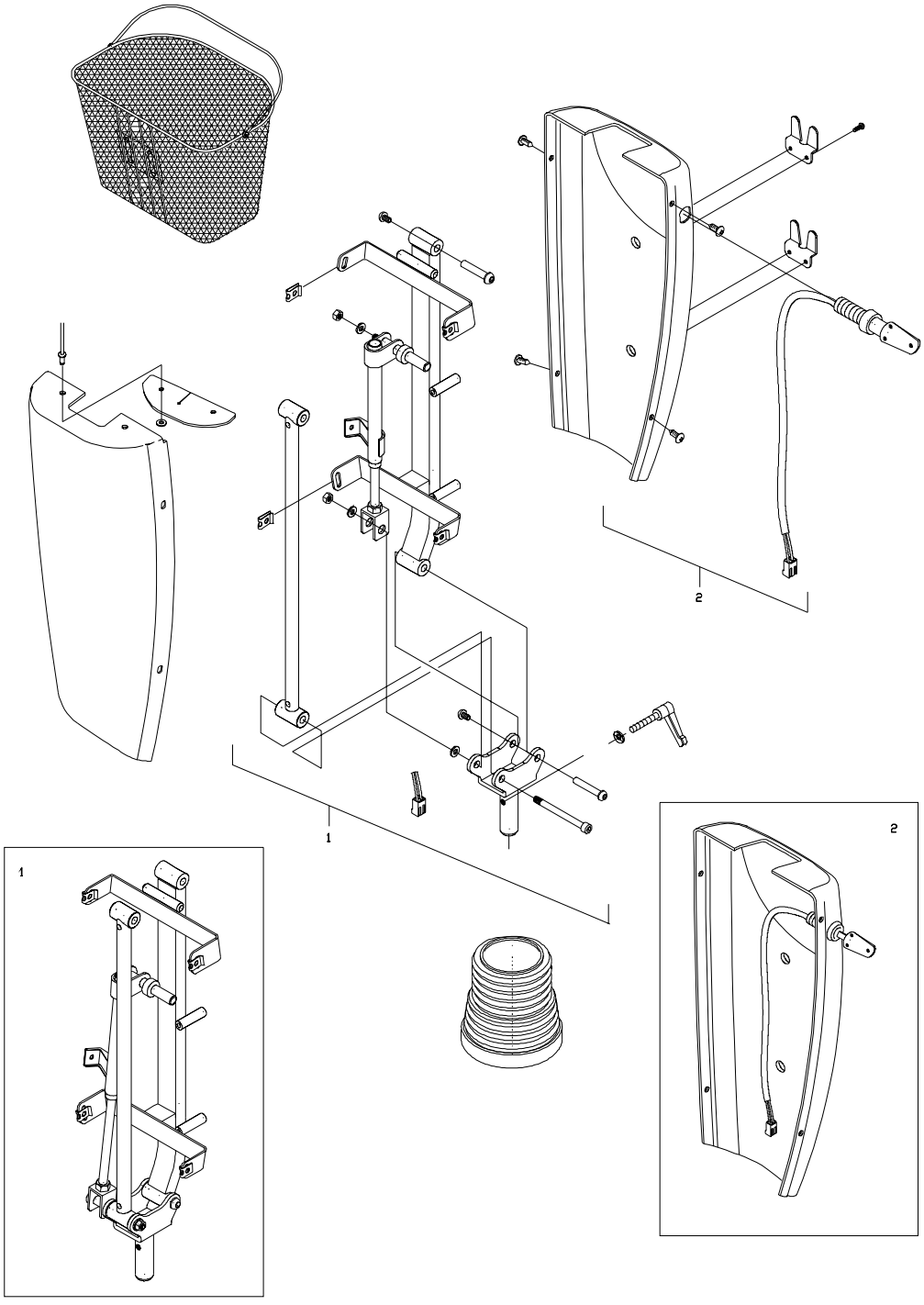
CAUTION:
Make sure you have blocked the vehicle up securely before working

Caution:
Risk of accidents!
Always carry out a functional test and a trial run after service work on the drive lever or electronics!

7.2.1 General

The handlebar and steering column individual parts are shown in the following drawings.




2
1
1
2

7.2.2 Operating console and keypad

Disassembly

1. Remove plastic caps.
2. Loosen Allen screws and washers and remove.
3. Carefully lift up operating console.
4. Remove the caps from the turret, and dismantle the turret.
5. Unscrew the operating circuit board.
6. Withdraw the conductor foil with plug.

7. Raise the double-layer keypad with a flat tool at any one location, and pull off.
8. Remove any adhesive remains from the self-adhesive foil.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.2.3 Steering column panelling

Disassembly

1. Loosen the screw connections between front and rear steering column panelling.
2. Remove the Phillips screws.
3. Dismantle the rear steering column panelling.
4. Loosen the screw connections between front steering column panelling and the basket holder.
5. Remove the Allen screws and the basket holder.
6. Carefully remove the front steering column panelling.
7. Pull out the keyswitch complete with wiring harness from the control panel and remove front panelling.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.2.4 Steering column adjustment Bowden cable

Disassembly

1. Dismantle the operating console (see section 7.2.2).
2. Dismantle the rear steering column panelling (see section 7.2.3).
3. Note down the Bowden cable route (sketch).
4. Loosen the union nut on the Bowden cable at the handle.
5. Twist the Bowden cable nut out of the handle.

6. Loosen the Phillips screw at the end of the Bowden cable out of the clamping sleeve and pull the Bowden cable out of the attachment.

7. Draw the clamping sleeve off the Bowden cable.

8. Remove the Bowden cable

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.2.5 Drive regulator

Disassembly

1. Dismantle the operating console (see section 7.2.1).

2. Loosen the potentiometer fixing.

3. Remove the Phillips screws.

4. Loosen the Allen screws located on the side of the potentiometer.

5. Pull the drive regulator out downwards.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.2.6 Potentiometer

Disassembly

1. Dismantle the operating console (see section 7.2.1).
2. Loosen the potentiometer fixing.
3. Remove the Phillips screws.
4. Loosen the Allen screws located on the side of the potentiometer.
5. Pull the potentiometer out downwards.
6. Strip the potentiometer cable of its insulation and de-solder.
7. Dismantle the spring, hex nut and U rail.

Reassembly

Caution:
When reassembling, ensure that the potentiometer or drive regulator is set to middle setting. Risk of accidents! The potentiometer has a standard value of around 5 kOhm. You must ensure that the potentiometer for the right-hand or left-hand connection to middle setting has exactly the same value using a digital multimeter.

1. Reassembly takes place in reverse order, and make sure you set the potentiometer to middle setting.

7.2.7 Lightbulbs, front

Disassembly

1. Dismantle the control elements (see section 7.2.1).
2. Loosen the Phillips screw.

3. Remove the headlight when it has been angled from bottom to top.

4. Turn bold holder out together with bulb.

5. Replace bulb.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.2.8 Headlights

Disassembly

1. Dismantle the bulbs (see section 7.2.7).

2. Remove headlights.

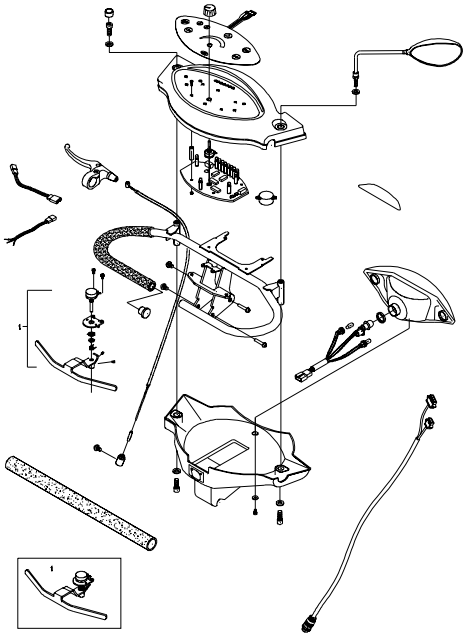
Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.2.9 Handlebar

Disassembly

1. Disassembly of the handlebar is shown in the adjacent exploded drawing.



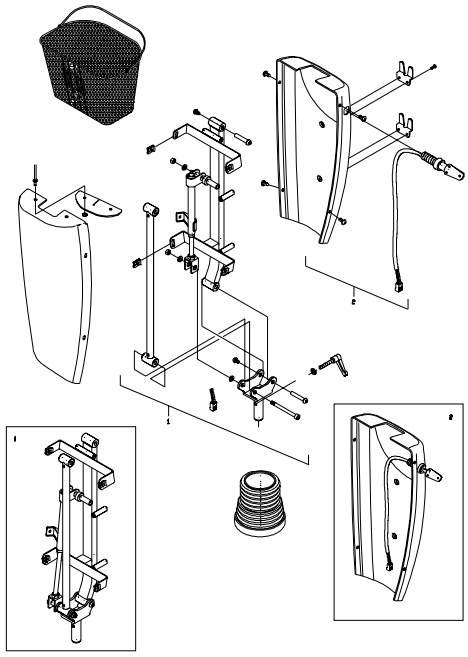
Reassembly

1. Reassembly takes place in the reverse order.

7.2.10 Steering column

Disassembly

1. Disassembly of the steering column takes place as shown in the adjacent exploded drawing.



Reassembly

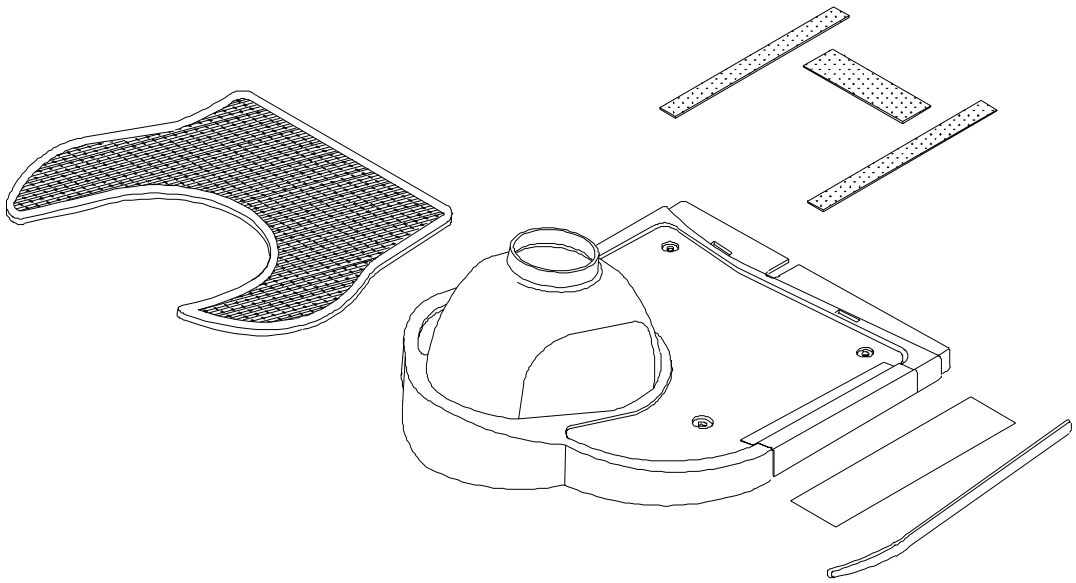
1. Reassembly takes place in the reverse order.

7.3 Panelling

7.3.1 Front panelling (three-wheeled version)

General

The front panelling individual parts (3-wheeled version) are shown in the following drawing.



Disassembly

1. Dismantle the steering column (see section 7.2.10.
2. Dismantle the rear panelling (see section 7.3.3).
3. Remove foot mat.
4. Loosen four Phillips screws.
5. Remove front panelling.

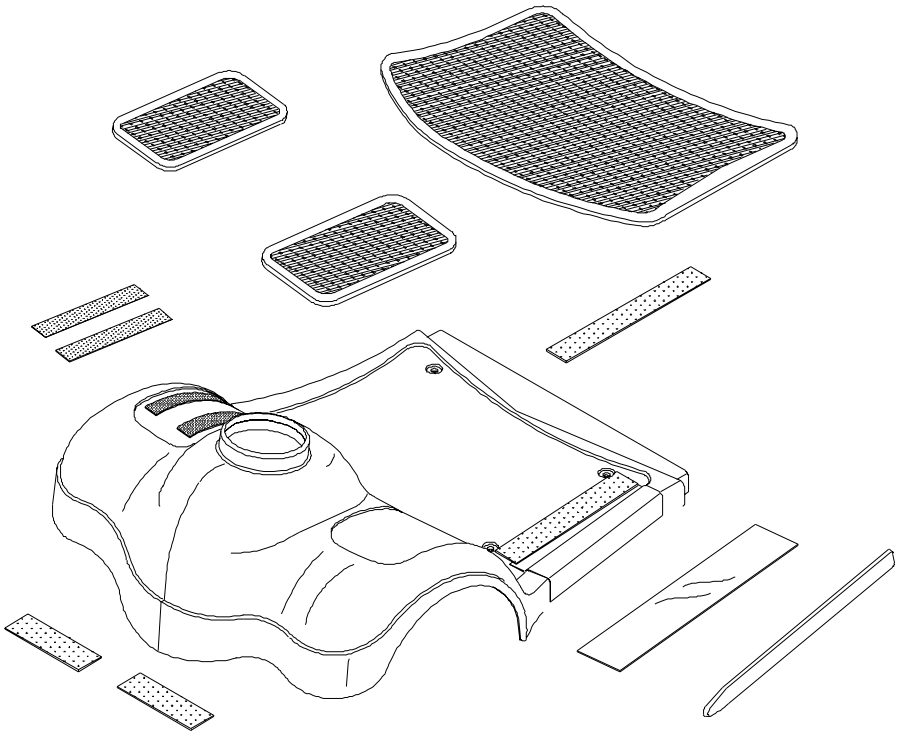
Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.3.2 Front panelling (four-wheeled version)

General

The front panelling individual parts (4-wheeled version) are shown in the following drawing.



Disassembly

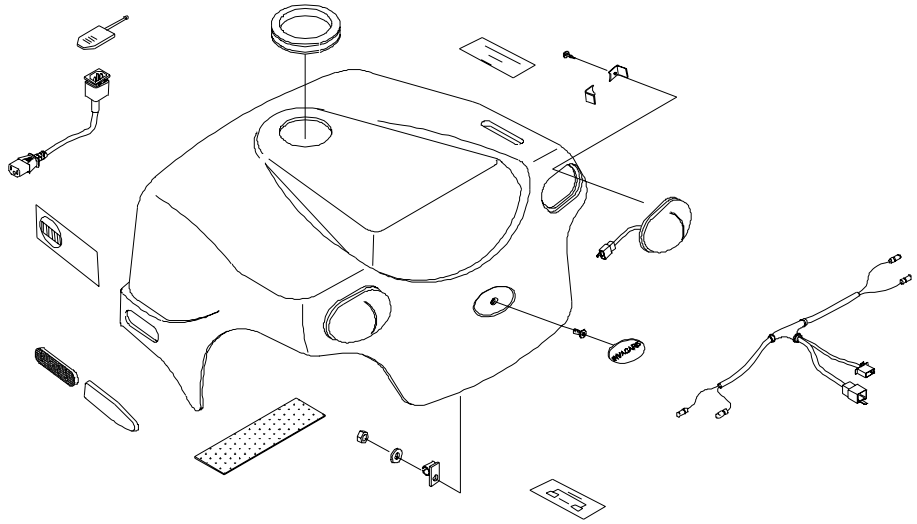
1. Dismantle the steering column (see section 7.2.10.
2. Dismantle the rear panelling (see section 7.3.3).
3. Remove foot mat.
4. Loosen four Phillips screws.
5. Remove front panelling.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.3.3 Rear panelling (three and four-wheeled version)

The rear panelling individual parts are shown in the following drawing.



Disassembly

1. Dismantle seat (see section 7.1.2).
2. Loosen side Velcro fastenings.
3. Loosen cable connections.
4. Remove rear panelling.

Reassembly

1. Reassembly (3 and 4-wheeled versions) takes place in reverse order to disassembly.

7.3.4 Lightbulbs, rear

Disassembly

1. Remove rear panelling (see section 7.3.3).
2. Unscrew the bulb together with bulb holder out of the rear panelling.
3. Replace the bulb.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.4 Wheels

✓ NOTE:
Disassembly of wheels and repair of tyres is described in the operating manual.

7.5 Disk brake

7.5.1 Brake Bowden cable

Disassembly

1. Dismantle the operating console (see section 7.2.2).
2. Dismantle the rear steering column panelling (see section 7.2.3).
3. Dismantle the rear panelling (see section 7.3.3).
4. Note down the Bowden cable route (sketch).
5. Loosen the Bowden cable clamp Allen screw at the brake saddle.
6. Loosen the brake Bowden cable union nut.
7. Twist the Bowden cable nut out of the brake saddle.

8. Loosen the union nut on the Bowden cable at the handle.
9. Twist the Bowden cable nut out of the handle.
10. Mark the cable binder positions along the brake Bowden cable route and release them.
11. Remove brake Bowden cable.

Reassembly

1. Reassembly takes place in reverse order to disassembly.
2. Adjust brake Bowden cable.

7.5.2 Brake calliper

Caution:
Before starting work, lay the vehicle down on its side on a relatively firm underlay, or block up the frame so that the steering wheels are not loaded.

Disassembly

1. Dismantle the brake Bowden cable (see section 7.5.1).
2. Loosen the Allen screws at the brake calliper and remove them together with washers.
3. Pull the brake calliper off the brake disc.

Reassembly

1. Push the brake calliper back over the brake disk.
2. Bolt to the brake calliper to the chassis with Allen keys and washers.
3. Fit the brake cable and adjust.

7.5.3 Brake disc

Caution:
Before starting work, lay the vehicle down on its side on a relatively firm underlay, or block up the frame so that the steering wheels are not loaded.

Disassembly

1. Dismantle drive wheel (see section 7.4).
2. Dismantle brake calliper (see section 7.5.1).
3. Remove distance ring and brake disk from the axle.

Reassembly

1. Fit the brake disk to the drive wheel on the right.

2. Fit the drive wheel (see section 7.4).

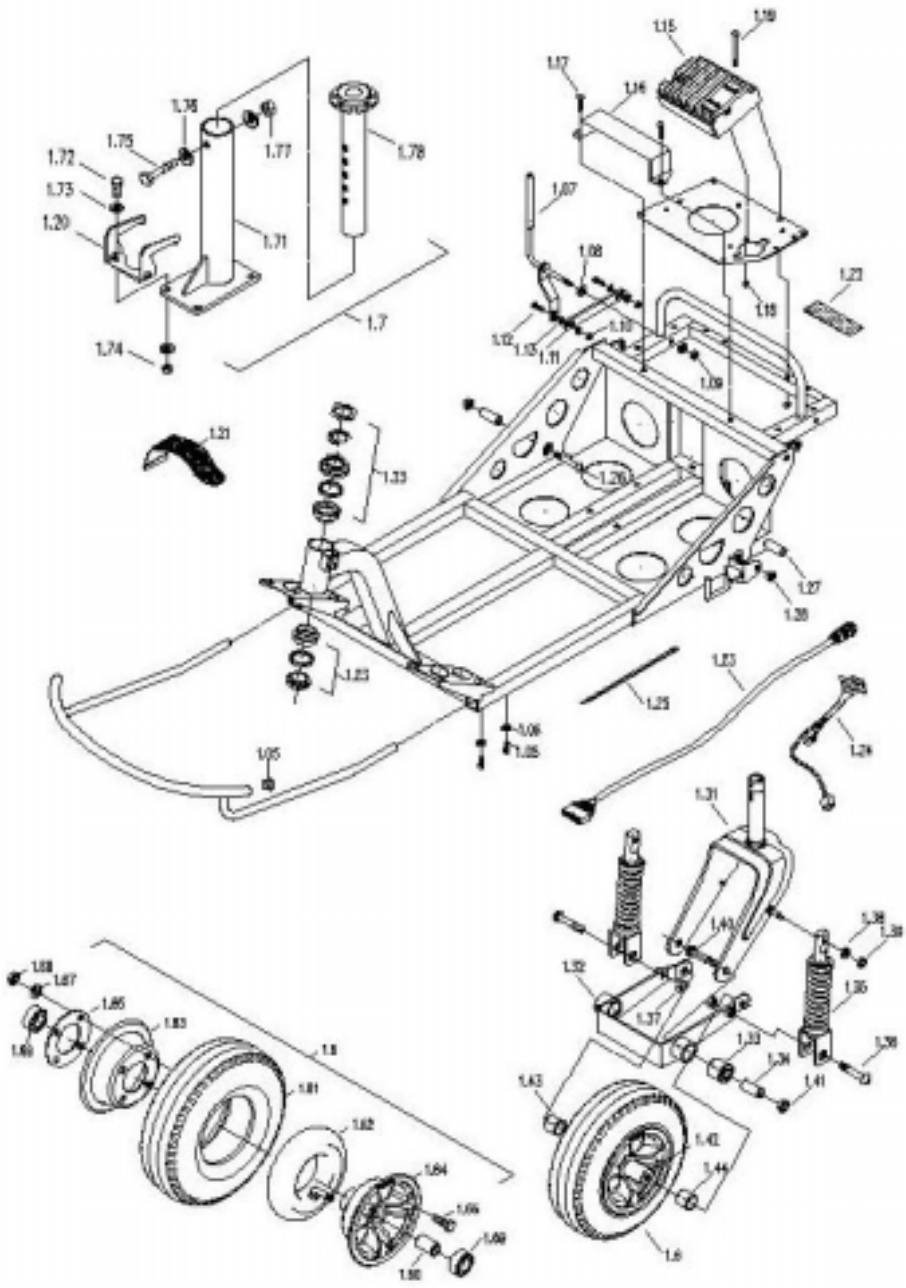
3. Fit the brake calliper (see section 7.5.1).

7.6 Front wheel suspension, three-wheeled version

Caution:
Before starting work, lay the vehicle down on its side on a relatively firm underlay so that the front wheel is not loaded and is easily accessible from both sides, or block up the vehicle securely.

7.6.1 General

The front wheel suspension individual parts for the 4-wheeled version are shown in the following drawing.



7.6.2 Front wheel axle

Disassembly

1. Dismantle the front wheel (see section 7.4).
2. Remove the sleeve and collar from the left-hand side of the wheel, then the sleeve and collar from the right.
3. Pull the axle out of the wheel.

Reassembly

✓ NOTE:
The left-hand side of the wheel is labelled with the word Invacare® on the top wheel flange.

1. Push the axle through the wheel.
2. Fit the washer and sleeve over the axle (right-hand wheel side).
3. Fit the collar and sleeve over the axle (left-hand wheel side).

7.6.3 Shock absorber, front

Disassembly

1. Dismantle the front panelling (see section 7.3.1).
2. Loosen the spring holder (turn collar) and slacken coil spring.
3. Loosen nuts from top and bottom suspension.
4. Pull the shock absorbers (with coil springs) and washers from top and bottom suspension.

Reassembly

1. Fit the shock absorbers (with coil springs) and washers onto the top and bottom suspension.
2. Place the nuts on the top and bottom suspension and screw tight.
3. Tighten the spring holders and tension the coil spring.

7.6.4 Wheel fork

Disassembly

1. Dismantle the steering column (see section 7.2.10.
2. Dismantle the front panelling (see section 7.3.1).
3. Dismantle the front wheel (see section 7.4).
4. Dismantle the shock absorber (see section 7.6.3).
5. Unscrew the top union nut.
6. Remove the angled panel.
7. Unscrew the bottom union nut.
8. Pull the wheel fork out downwards.
9. Pull the bearing set out of the chassis bearing sleeve and then remove the wheel fork.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

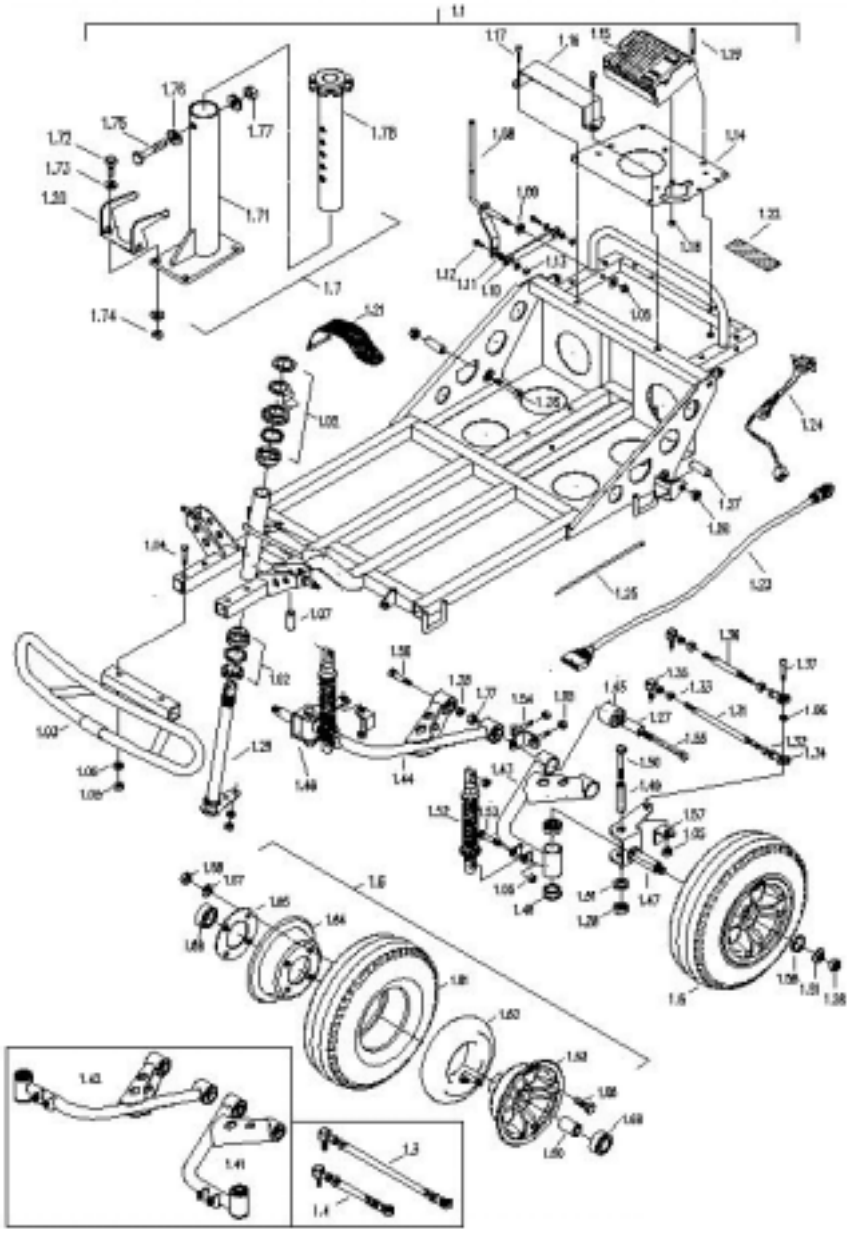
✓ NOTE:
The bearing must be adjusted using the bottom union nut. The bearing must not be allowed to have any play, and the wheel fork must be easily turned.

7.7 Front wheel suspension, four-wheeled version

Caution:
Before starting work, lay the vehicle down on its side on a relatively firm underlay so that the front wheel is not loaded and is easily accessible from both sides, or block up the vehicle securely.

7.7.1 General

The front wheel suspension individual parts for the 4-wheeled version are shown in the following drawing.



7.7.2 Shock absorber, front

Disassembly

1. Dismantle the front panelling (see section 7.3.2).
2. Loosen the spring holder (turn collar) and slacken coil spring.
3. Remove the bottom Allen screw, the Allen screw with internal threads, two collars and the sleeve.
4. Remove the top nut, two washers and the collar.
5. Pull the shock absorber (with coil spring) and collar off the top suspension.

Reassembly

1. Place the collar on the top suspension.
2. Place the shock absorber (with coil spring), collar and two washers.
3. Tighten the nut.
4. Insert the sleeve centrally in the bottom shock absorber spring holder.
5. Put one collar on each side of the sleeve.
6. Fit the shock absorber with the Allen screw with internal thread, and the Allen screw, and screw up tight.
7. Tighten the spring holders and tension the coil spring.

7.7.3 Steering linkage

Disassembly of the steering linkage

1. Dismantle the front panelling (see section 7.3.2).
2. Remove the nut, washer and the stop.
3. Remove the Allen screw.
4. Remove the TO linkage (to fork steering tube), washer and FROM linkage (to right-hand wheel).

5. Push the TO linkage upwards.
6. Hold the ball pin axle up with flat-nosed players between the FROM linkage and the stub axle.
7. Loosen the nut, and remove together with FROM linkage.

8. Push the FROM linkage upwards.
9. Hold the ball pin axle up with flat-nosed players between the TO linkage and the fork steering tube.
10. Loosen the nut, and remove together with TO linkage.

Reassembly of steering linkage

✓ NOTE:
When reassembling the steering linkage, you must adjust it so that the steering is located centrally and the tracking is parallel.
The stop must be adjusted when reassembling.

1. Fit the FROM linkage (to fork steering tube), washer and TO linkage (to right-hand wheel) with the Allen screw in the left-hand stub axle.

2. Screw the stop, washer and nut to the Allen screw below the stub axle.

3. Fit the FROM linkage ball pin into the right-hand stub axle, and fit the washer and nut.

4. Raise the FROM linkage.

5. Hold the ball pin on the FROM linkage up with flat-nosed pliers and tighten the nut.

6. Fit the TO linkage ball pin into the fork steering tube, and fit the washer and nut.

7. Raise the TO linkage..

8. Hold the ball pin on the TO linkage up with flat-nosed pliers and tighten the nut.

7.7.4 Stub axle

Disassembly

1. Dismantle the front panelling (see section 7.3.2).
2. Remove the front wheel (see section 7.4).
3. Dismantle the steering linkage (see section 7.7.3.
4. Remove the nut from the bolted connection.
5. Remove the nut, collar and the hex bolt.
6. Remove the stub axle.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

7.7.5 Transverse control arm

✓ NOTE:
When disassembling or reassembling a transverse control arm, both control arms are affected when loosening or tightening the internal bolted connection!

Disassembly of the transverse control arm

1. Dismantle the shock absorber (see section 7.7.1).
2. Dismantle the steering linkage (see section 7.7.3).
3. Dismantle the stub axle (see section 7.7.4).
4. Loosen the nut on the outside assembly eye.
5. Remove the nut and the Allen screw.
6. Loosen the nut on the inside assembly eye.
7. Remove the nut and the Allen screw.
8. Remove the transverse control arm.

Reassembly of the transverse control arm

1. Reassembly takes place in reverse order to disassembly.

7.7.6 Fork steering tube

Disassembly of the transverse control arm

1. Dismantle the steering column (see section 7.2.10.
2. Dismantle the steering linkage (see section 7.7.3).
3. Unscrew the top union nut.
4. Remove the angled panel.
5. Unscrew the bottom union nut.
6. Pull the wheel fork out downwards.
7. Pull the bearing set out of the chassis bearing sleeve and then remove the wheel fork.

Reassembly

1. Reassembly takes place in reverse order to disassembly.

✓ NOTE:
The bearing must be adjusted using the bottom union nut. The bearing must not be allowed to have any play, and the wheel fork must be easily turned.

7.8 Batteries

⚠ **Caution:**
Observe the safety information (see chapt. 2)! Do not bridge battery terminals, risk of short circuit! Take care when removing batteries, risk of crushing! Take off all rings or metal jewellery worn on hands and wrists.
Always remove first the negative battery terminal and then the positive battery terminal.
Charging the batteries: see also operating manual.

7.8.1 Checking the battery (batteries) battery cable and fuses

1. Check the total voltage at the operating console charging socket using a multimeter.
   Voltage below 24V: charge batteries.

2. Voltage below 18V: Check individual battery voltages.

3. Unclamp battery terminal.

4. Check voltage across battery terminals.

5. Voltage under 9V: Charge batteries. If the undervoltage cannot be rectified by charging, replace affected battery.

✓ Note:
If the individual voltages measured across the battery terminals are correct, but the total voltage at the charging socket is not correct, check the cable and strip fuse blocks.

6. Carefully unscrew the fuse holder.

7. Remove the 5AG80 A fuse.

8. Replace the damaged fuse.

7.8.2 Removing or refitting battery (batteries)

✓ Note:
Removal and refitting of the batteries is described in the operating manual.

7.9 Electronics box

⚠ **Caution:**
Remove battery fuses.

⚠ **Caution:**
Before starting work, lay the vehicle down on its side on a relatively firm underlay so that the chassis floor beneath the electronics box is easily accessible, or block up the vehicle securely.

7.9.1 Removing the electronics box

1. Dismantle the rear panelling (see section 7.3.3).

✓ Note:
Note down the position of the cable plugs on the electronics box.

2. Remove all cable plugs from the electronics box.

3. Loosen the electronics box bolted connection on the chassis floor (four Phillips screws with locknuts).

7.9.2 Refitting the electronics box

1. Screw the electronics box to the chassis floor using four Phillips screws and locknuts.

2. Plug all the cable plugs into the electronics box again in the positions you noted earlier.

7.10 Drive

CAUTION:
Make sure you have blocked the vehicle up securely before working. The ground clearance must be at least 150 mm in order to be able to remove the drive. Please note the high drive unit weight, risk of crushing! Always carry out a functional test and trial run after service work on the drive. Risk of accidents!

CAUTION:
Remove the battery fuses in accordance with the operating manual.

7.10.1 Disassembly

✓ NOTE:
Note down the position of the cable plugs on the electronics box.

1. Dismantle the rear panelling (see section 7.3.3).
2. Remove the drive cable plugs.
3. Dismantle the drive wheels (see section 7.4).
4. Loosen the axle fixing and bearing bolted connections.
5. Remove the Allen screws, washers and nuts.
6. Remove the axle mounting bracket.
7. Remove the drive unit.

7.10.2 Reassembly

1. Place the drive unit on the chassis.
2. Place the axle mounting bracket on the drive unit.
3. Screw the axle mounting bracket to the chassis using the Allen screws, washers and nuts.
4. Plug the drive cable plugs back in in the positions you noted previously.

7.10.3 Replacing carbon brushes

1. Dismantle the rear panelling (see section 7.3.3).
2. Unscrew the four plastic slotted screws out of the drive unit.

3. Replace the carbon brushes located behind the plastic slotted screws.
4. Reassembly takes place in reverse order to disassembly.